

CLAIMS

1. A fixing apparatus comprising:
  - a heat-producing element that heat-fixes an  
5 unfixed image on a recording medium onto the  
recording medium;
  - a heating apparatus that heats said  
heat-producing element;
  - a cooling apparatus that cools an entire paper  
10 passage area of said heat-producing element;
  - a heating width changing apparatus that  
changes a heating width of said heat-producing  
element so that, when a recording medium of smaller  
size than a maximum heating width of said  
15 heat-producing element is passed through, a paper  
passage width of the small-size recording medium is  
made to produce heat; and
  - a control section that performs uniformizing  
control that directs said heating apparatus and also  
20 directs said cooling apparatus so that the recording  
medium is not passed through, and heating of a  
heating width that causes a paper passage area of  
the small-size recording medium to produce heat is  
maintained and an entire paper passage width of said  
25 heat-producing element is cooled, until the paper  
non-passage area of said heat-producing element is  
at or below a temperature at which fixing is

possible.

2. The fixing apparatus according to claim 1,  
wherein:

5       said heat-producing element is a rotating  
element supported rotatably; and

      said cooling apparatus has a rotational drive  
apparatus that idles said heat-producing element in  
a paper non-passage state.

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3. The fixing apparatus according to claim 1,  
wherein:

      said heating apparatus has a magnetic flux  
generation apparatus that generates magnetic flux,  
15 and an opposed core located opposite the magnetic  
flux generation apparatus;

      said heat-producing element is configured with  
a movable element that moves between the magnetic  
flux generation apparatus and the opposed core, and  
20 is induction-heated by magnetic flux that crosses  
with the movable element when the movable element  
passes between the magnetic flux generation  
apparatus and the opposed core; and

      said heating width changing apparatus has a  
25 magnetism masking element that moves relative to the  
magnetic flux generation apparatus in a direction  
of movement of said heat-producing element, and the

magnetism masking element is displaced between a magnetic path blocking position in which a magnetic path corresponding to the paper non-passage area of said heat-producing element between the magnetic  
5 flux generation apparatus and the opposed core is blocked and a magnetic path clearing position in which the magnetic path is cleared.

4. The fixing apparatus according to claim 1,  
10 wherein said control section performs the uniformizing control when a recording medium of larger size than the small-size recording medium is passed through after the small-size recording medium has been passed through.

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5. The fixing apparatus according to claim 1, wherein said control section performs the uniformizing control on receiving a detection signal that detects that a number of sheets of the  
20 small-size recording medium consecutively passed through has reached a predetermined number.

6. The fixing apparatus according to claim 1, further comprising at least one detecting element  
25 that detects a temperature of the paper non-passage area of said heat-producing element;

wherein said control section performs the

uniformizing control when the detected temperature obtained by the detecting element has exceeded a predetermined temperature due to the fact that the small-size recording medium has been continuously  
5 passed through.

7. The fixing apparatus according to claim 1, wherein said heating width changing apparatus can change the heating width in steps, and when a paper  
10 passage width of the recording medium passed through to said heat-producing element and a heating width closest to that paper passage width are different, changes to a heating width larger than a paper passage width of the recording medium in one step.

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8. The fixing apparatus according to claim 1, further comprising a forced draft cooling apparatus that cools at least a paper non-passage area of said heat-producing element by means of blown air.

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9. The fixing apparatus according to claim 8, wherein: said heating width changing apparatus can change the heating width in steps; and said forced draft cooling apparatus, when a paper passage width  
25 of the recording medium passed through to said heat-producing element and a heating width closest to that paper passage width are different, cools at

least a paper non-passage area of said heat-producing element.

10. The fixing apparatus according to claim 6,  
5 wherein the each detecting element is provided for each paper non-passage area corresponding to respective heating widths changeable by said heating width changing apparatus.

10 11. The fixing apparatus according to claim 10, wherein the detecting element detects a temperature of the paper non-passage area of said heat-producing element at a location where a temperature of the paper non-passage area is a peak value.

15 12. The fixing apparatus according to claim 6, wherein the detecting element is composed of one detecting element provided in a freely movable fashion between paper non-passage areas  
20 corresponding to respective heating widths changeable by said heating width changing apparatus.

13. The fixing apparatus according to claim 12,  
25 wherein the detecting element detects a temperature of the paper non-passage area of said heat-producing element at a location where a temperature of the

paper non-passage area is a peak value.

14. The fixing apparatus according to claim 1,  
further comprising a magnetism masking element that  
5 lowers a magnetic flux density of a magnetic field  
that acts on an area outside a maximum paper passage  
area in a paper passage width direction of said  
heat-producing element.

10 15. The fixing apparatus according to claim 14,  
wherein:

said heating apparatus has a magnetic flux  
generation apparatus that includes an exciting coil  
that extends in a paper passage width direction of  
15 said heat-producing element and is wound so as to  
loop back outside a maximum paper passage area in  
a paper passage width direction of said  
heat-producing element; and

said magnetism masking element is provided at  
20 a loopback location of the exciting coil.

16. The fixing apparatus according to claim 14,  
wherein:

said heating apparatus has a magnetic flux  
25 generation apparatus that generates magnetic flux,  
and

an opposed core provided opposite the magnetic

flux generation apparatus; and said magnetism masking element is provided on the opposed core.

17. The fixing apparatus according to claim 14,  
5 wherein said magnetism masking element can be freely advanced and withdrawn with respect to a magnetic field that acts on an area outside a maximum paper passage area in a paper passage width direction of said heat-producing element.

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18. The fixing apparatus according to claim 14, wherein: said heating apparatus has a magnetic flux generation apparatus that generates magnetic flux; and said magnetism masking element is provided in  
15 the magnetic flux generation apparatus.

19. The fixing apparatus according to claim 18, wherein: the magnetic flux generation apparatus has an exciting coil that extends in a paper passage  
20 width direction of said heat-producing element and is wound so as to loop back outside a maximum paper passage area in a paper passage width direction of said heat-producing element; and

said magnetism masking element is provided on  
25 at least one of an inner side or rear side of the exciting coil.

20. The fixing apparatus according to claim 14, wherein said magnetism masking element is a low-permeability electrical conductor.

5 21. An image forming apparatus comprising the fixing apparatus according to claim 1.

22. An image forming apparatus comprising:  
an image forming section that forms an unfixed  
10 image on a recording medium; the fixing apparatus according to claim 1 that heat-fixes the unfixed image formed on the recording medium onto the recording medium; and a paper feed mechanism that feeds the recording medium toward said image forming  
15 section and the fixing apparatus at predetermined timing;

wherein a paper feed interval of said paper feed mechanism for the recording medium is longer than a normal paper feed interval.

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23. A temperature control method comprising:

a heat-fixing step of heat-fixing an unfixed image on a recording medium onto the recording medium by means of a heat-producing element;

25 a heat-producing element heating step of heating the heat-producing element so that the heat-producing element maintains a predetermined



fixing temperature;

a cooling step of cooling an entire paper passage area of the heat-producing element;

a heating width changing step of changing a  
5 heating width of the heat-producing element so that,  
when a recording medium of smaller size than a  
maximum heating width of the heat-producing element  
is passed through, a paper passage width of the  
small-size recording medium is made to produce heat;  
10 and

a control step of performing uniformizing  
control so that the recording medium is not passed  
through, and heating of a heating width that causes  
a paper passage area of the small-size recording  
15 medium to produce heat is maintained and an entire  
paper passage width of the heat-producing element  
is cooled, until a paper non-passage area of the  
heat-producing element is at or below a  
predetermined temperature at which fixing is  
20 possible.